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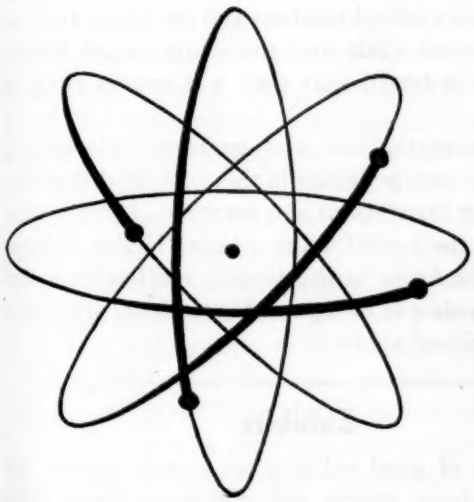

UNIVERSITIES FACE RESPONSIBILITIES IN ATOMIC ENERGY

By DAVID E. LILIENTHAL*

THE AMERICAN PEOPLE owe a debt of gratitude to the colleges and universities of our country which have participated in activities resulting in significant development of atomic energy. Without the aid of these institutions of higher learning and without the wholehearted support of their faculties, this progress would not have been possible.

The role of higher education in the atomic energy program will continue to be an important one. Pure research in still relatively unexplored fields of nuclear physics will demand the constant and continuing attention of students and faculty members alike. Responsibilities will exist, as well, in connection with the intelligent and careful interpretation of the innumerable social and economic implications which have arisen, and which will continue to arise, as a result of the advent of controlled nuclear fission. Serious study must be given by the scholars of our colleges and universities to the problems of living in this new atomic age.

It is satisfying and encouraging to see the attention being given to these all-important matters by students and teachers in our schools of higher learning. The contribution of this great cooperative effort to our national welfare will, I am convinced, be significant and lasting.

*Chairman, United States Atomic Energy Commission.

IN THIS ISSUE

	Page
Universities Face Responsibilities	121
Office Committee on Educational Implications	122
Exhibits	122
Higher Education and the Atom	123
National Laboratories and Atomic Energy Program	127
AEC Fellowship Program	128
Students Participate in University Councils	129
Guides to the Literature on Atomic Energy	130
Atomic Energy Films	131

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Office Committee on Educational Implications of Atomic Energy

By HENRY H. ARMSBY*

THE DEVELOPMENT of atomic energy has created a need for educational services which bring to the public information that will assist in the formulation and support of sound national policies. This issue of HIGHER EDUCATION represents an effort toward meeting that need. It is one activity of the Office of Education Inter-divisional Committee on the Educational Implications of Atomic Energy. Another is a forthcoming issue of SCHOOL LIFE, the official journal of the Office addressed to elementary and secondary schools.

General Functions

The Committee includes representatives of all divisions of the Office and a representative of the Atomic Energy Commission. Liaison has been established with the National Council of Chief State School Officers, the Department of National Defense, and the Department of State.

The Committee assists the several divisions of the Office in performing their duties with respect to the collection and dissemination of information concerning education. Its main functions are: (1) Coordination of the selection and collation of data on school and college courses involving atomic energy developments; (2) service as a clearing-house for material related to the educational implications of atomic energy developments; (3) cooperation with other educational groups and civic-minded organizations in planning, initiating, and, where appropriate, directing conferences, workshops, and exhibits; (4) cooperation with appropriate agencies to develop a public awareness and understanding of the potentialities of atomic energy for our national welfare and security and for our personal health and happiness.

Activities

The Committee arranged a meeting for the staff of the Office of Education in Washington in October 1948 to which other persons in the city were invited. At this time addresses were made on atomic energy and its implications, exhibits were shown, and a short bibliography was distributed.

Representatives of the Committee have participated in a State-wide meeting of educators and community leaders in Nebraska, in a meeting of the Central Association of Science and Mathematics Teachers, and in a series of seminars at American University on "The Economic Aspects of Atomic Energy Utilization."

The Committee plans to publish two annotated bibliographies on atomic energy, one for elementary and secondary school teachers and students, and one for the general adult and the nontechnical college reader. It is hoped that they will appear early in 1949.

The Committee has also gathered information about significant activities in this field for dissemination to other institutions and teachers. The information forms the basis for the article "Higher Education and the Atom in this issue." Replies from secondary schools will be reported in the issue of SCHOOL LIFE mentioned above.

Exhibits

A NUMBER of good exhibits on atomic energy are available, from which the following have been selected.

Life Magazine Photographic Exhibit. 24 panels, 24 by 32 inches. Requires approximately 64 running feet of space for hanging. Weight boxed, 50 pounds. Distributed by the National Committee on Atomic Information. Available through Tom Mabry, 9 Rockefeller Plaza, New York 20, N. Y. Sale price, $35. Exhibit includes quotations from Report of International Control of Atomic Energy, prepared by the Secretary of State Committee, and running commentary and captions.

American Chemical Society Exhibit. Loan; obtainable from the American Chemical Society, 1115 Sixteenth Street, NW., Washington, D. C.

Dunning Exhibit. Lecture-demonstration by John R. Dunning, Physics Department, Columbia University, New York, N. Y.

Fire and Fission. 8 panels, 8 by 8 feet. Prepared by Brookhaven National Laboratory. Booking confined to northeastern section of the United States. Obtainable through Mike Amrine, Brookhaven National Laboratory, Upton, N. Y.

*Specialist in Engineering Education, Office of Education. Chairman of the Committee.

Higher Education and the Atom

By CLAUDE E. HAWLEY*

THE ATOMIC AGE is the product and the responsibility of higher education in a very real sense. The first controlled nuclear chain reaction occurred on a university campus. It was made possible by long years of research in university laboratories.

This issue of HIGHER EDUCATION is devoted to a consideration of some of the educational implications of atomic energy among the colleges and universities of the Nation. The data were compiled from responses to a letter of inquiry sent to the colleges and universities requesting general information about such of their activities as may be attributed to recent scientific developments.

Of the nearly 500 institutions (in 47 States) from which replies were received, 50 percent said that atomic energy developments had affected their activities only incidentally, and 30 percent indicated that they had nothing worth mentioning to report. (Presumably those that did not reply also fall into this category.) Many respondents said that they saw no reason why their curriculums should do more than reflect the recent discoveries concerning energy as but another step in long-range continuous development. In contrast, a few expressed regret because they had so little to report.

Spokesmen for the nearly 100 institutions that appear to be taking extraordinary measures to stress their new problems and responsibilities generally justified their action on the grounds that atomic energy is everybody's business. They have acted on the assumption that the new physical forces unleashed are the concern of everyone in a democratic community where the power to make decisions must be widely shared. To share power effectively, they contend, the citizens must be informed on at least the rudiments of the major events of their time. Atomic energy development is a major event. Those who know about it have the responsibility of sharing their knowledge with as many of their fellow citizens as they can reach. Only thus, they conclude, can intelligent mass decisions be made.

In the summary that follows, as elsewhere in this issue, space limitations precluded mention of more than a few representative institutions that are active in developing atomic energy programs.

Changes in the Content of General Education

A new emphasis on general educational requirements is attributed by a number of educators to the necessities of the atomic era. The State University of Iowa reports a "drastic change" in its engineering curriculum, in that the time devoted to courses in the social sciences and humanities has been doubled. The Montana School of Mines has likewise broadened its foundation in general education in recognition of the increased social responsibilities of its graduates. Thirteen schools (several of them technical institutions) report curriculum committees at work to consider broadening the educational base within the framework of their present standards and requirements.

The social sciences are being overhauled here and there with the object of integrating courses in that field more closely with pertinent phases of physics. One institution has introduced a unit on the social effects of atomic energy, and four teachers colleges have increased the physics requirements for all students. At least five institutions, deploring the scientific illiteracy of their students, have increased the natural science requirements for the bachelor of arts degree.

Changes in Existing Courses

Virtually every institution reporting a change due to recent atomic energy developments indicated that the content of existing courses had been altered to include some discussion of, if not formal units on, the new phenomena. As one respondent said: "I doubt that we can name one course that has been added. I doubt that we can name one course that is not affected."

The amount of time devoted to atomic structure and radioactivity has been increased appreciably in courses in the physical sciences. Instructors in the

*Associate Chief for Social Sciences, Division of Higher Education, Office of Education. Dr. Hawley was chairman of the committee responsible for preparing this issue of HIGHER EDUCATION. The other members were Henry H. Armsby and Ralph M. Dunbar.

biological sciences are giving more attention to the use of tracers and the effects of radiation in furthering knowledge in their fields. Professional schools concerned with developments in the natural sciences, particularly those of engineering and medicine, report pronounced shifts of emphasis in many of their courses as a result of the new and prospective uses of atomic energy.

Numerous changes were reported in the course content of the social sciences. Integrated courses in that field have included special units or lectures on the social implications of atomic energy development. Twenty-two sociologists say they are giving greater consideration to the social effects of the many probable new inventions. (One considers the subject of atomic energy in his course on social pathology.) Political science classes, especially those in international relations, are being increasingly devoted to the problem of control of atomic weapons. Other courses in government reemphasize the responsibilities of democratic citizenship. Six "Great Issues" courses devote some time to atomic energy.

The Alabama Polytechnic Institute and Oklahoma Agricultural and Mechanical College report courses in education that emphasize the role of the teacher as an interpreter of the implications of atomic energy developments, and the University of Idaho has held a curriculum workshop on that subject.

Changes in miscellaneous courses scattered throughout the higher education curriculum have reflected the effects of atomic energy developments. Although most of the theological schools reported that the nature of their work precluded the necessity for considering atomic energy, a few indicated grave concern over new developments. One professor of religion stated that "a renewed emphasis for the need of human brotherhood and the break-down of segregations of minority groups has come into our teaching with the arrival of the atomic bomb." The Smyth report is used in another professor's course in "Contemporary Resources for Ethical Living."

Similar reactions come from philosophy faculties whose concern with the moral aspects of recent technological developments is reflected in their teaching of certain technical aspects of atomic energy. Two classes in journalism are devoted in part to a layman's explanation of recent atomic developments, while the subject matter of courses in literature, drama, art, and speech includes representative symbols of the atomic age.

New Courses

Science courses for nonscience majors have been introduced at several institutions as a direct response to the demand by laymen to know something "not-too-technical" about the atom. Bennington College gives its students a choice of three such new courses, one of which focuses attention on the impact of science on society, the status of science in different political environments, and the problem of extending the scientific method to fields outside the natural sciences. Evansville College offers a course for adults entitled "Nuclear Physics for the Layman," and San Jose State College lists one called "Science and the Citizen."

A large number of new courses has been added to the regular science curriculum. Most of them are in nuclear physics and chemistry. Several graduate seminars dealing with nucleonics, nuclear techniques, biophysics, and isotopes are reported. Physics courses entitled "History and Implications of Atomic Energy" at Michigan State College, "Current Problems and Literature in Physics" at Cornell College, and "Recent Developments in Science" at Morningside College have been introduced in the last 3 years. New related engineering courses reported include those on "Elementary Atomic Power Engineering" at Case Institute and "Quantum Mechanics" at the University of Akron. An Institute for Atomic Research has been started at Iowa State College.

Several new courses relating the social sciences to atomic energy have made their appearance. George Pepperdine College offers a 1-year upper division course in political science entitled "Studies in Atomic Implications." The economics department of American University offers a new graduate seminar on the "Economic Aspects of Atomic Energy Utilization." Seminars or courses on the social effects of atomic energy in peace and war (University of Florida), on atomic energy and its social implications (Atlanta University), and on invention, technology, and social change (Bard College) have all appeared in the wake of the atomic bomb.

Teachers colleges and departments of education report the introduction of courses, seminars, and workshops on the educational implications of atomic science (State Teachers College, Glassboro, N. J.), education in the atomic age (State Teachers College, Kirksville, Mo.), secondary school curriculums on the control of atomic energy (University of Kansas), and world citizenship (University of Illinois).

Two new courses in schools of religion—"The Minister and Science" (Berkeley Baptist Divinity School) and "Christianity and Public Affairs" (Louisville Presbyterian Seminary)—are also products of the atomic age.

Teaching Aids

Relatively few institutions have directed any significant attention to the preparation and use of special teaching aids for courses or units concerned with atomic energy development.

The available films on the subject, discussed elsewhere in this issue, are used from coast to coast. Those on the scientific aspects of atomic physics are used primarily in specialized classes, while the more general films, such as those on the Bikini tests, are used for assembly programs. Schools of theology and others show "The Church and the Atomic Age" rather extensively and "God of the Atom" occasionally. Some film strips are also in use.

At a number of colleges, the faculty or students or both have constructed their own teaching aids. The simplest (and most frequently reported) is the demonstration of a chain reaction by the use of mousetraps so arranged as to spring one after another, following an initial stimulus. Other aids vary from simple slides to the elaborate atomic models described by one dean as "flexible, elastic, constructible, dissectible, and electrically illuminated." In some teachers colleges, the students prepare resource and instructional units that serve as aids to subsequent classes. A number of instructors have found displays of uranium, radium, and other available ores to be useful in classroom work.

"Popular" lecture-demonstrations are presented occasionally for the announced purpose of making the complexities of atomic energy developments intelligible to the nontechnical student. Among the devices used by lecturers are Geiger counters, artificially radioactive isotopes, and model atomic piles.

The use of phonograph recordings dealing with atomic energy is reported by Mount Mercy College and Ball State Teachers College. One economics instructor records the proceedings of his seminar on economic aspects of atomic energy utilization.

Of the printed materials used, the charts and leaflets produced by two commercial electrical products companies and one publisher are widely distributed. Other materials which many college libraries have circulated repeatedly since VJ-day include the Smyth report, the *Bulletin of the Atomic Scientists*, *Nucleonics*, *Nuclear Science Abstracts*, the University of Illinois publication entitled *Living in the Atomic Age*, and the publications of the United States Atomic Energy Commission.

Relatively few universities are so happily situated financially or geographically as to provide their students with highly specialized laboratory equipment, cyclotrons and betatrons, and specially constructed exhibits of all sorts.

Special Events

A number of occasions arise in the course of an academic year on which campus and community attention may be directed toward the social as well as physical problems related to atomic energy. Speakers are brought in for general assemblies, chapel services, and convocation ceremonies. Some colleges have held special conferences, forums, or symposia on atomic energy or on related world affairs.

In other instances, discussions have been under the auspices of an "institute on reconstruction in an era of atomic power," an "institute for atomic research," or more broadly, institutes of citizenship (Kansas State College) or of world government (Rollins College).

Students have actively interested themselves in atomic affairs to the extent of devoting to them special meetings of their science, social science, international relations, and education clubs, and in some cases they have formed committees on atomic implications. Special editions of the student newspaper at the University of Southern California and of the campus literary magazine at the University of Santa Clara have been devoted to atomic issues.

The faculty, in turn, learns more about atomic energy through panel discussions and conferences. On two campuses (the Universities of Alabama and Maine) faculty clearinghouses for atomic information have been established. Elsewhere institutions permit or encourage their teachers to attend conferences or to work at the national laboratories as opportunities arise.

Evidence of educators' concern for disseminating information about atomic energy to the world outside the ivory tower appears occasionally. Clemson College actively cooperated with an "Association of Scientists for Atomic Education" in trying to arouse an interest in the social and political implications of

atomic energy among the business and professional people of several cities in the South. Other institutions report as many as 100 speeches in an academic year by their faculty members. A number of colleges maintain speakers' bureaus from which interested groups may select persons willing and able to speak on atomic energy. Many a university radio program in the past 3 years has been devoted to the subject. Popular newspaper and magazine articles are occasionally contributed by professors.

Several instances have been reported of joint campus-community projects to stimulate interest in the atomic age. Usually the college invites the public to attend meetings, movies, and exhibits, although sometimes the events are held on community property under the sponsorship of the college. Special traveling exhibits, both popular and technical, are displayed. Librarians frequently present an attractive showing of available literature in the field. Some institutions sponsor exhibits at such events as State fairs.

Miscellaneous projects include an art department exhibit on "Bikini and the Atomic Bomb," a play entitled "$E=MC^2$," (at Smith College), and an "Atomic Energy Day" at New Mexico College of Agriculture and Mechanic Arts.

Adult education programs are sometimes devoted to atomic energy developments. The extension divisions at two State universities sponsor conferences for adults; several institutions present night courses for laymen.

A special effort is made in certain areas to reach high school teachers and students. One institution conducts training courses in atomic energy for teachers, while other schools hold special meetings or issue periodical bulletins for the same audience. Programs and contests on atomic energy, such as those sponsored by Virginia State College, are designed to stimulate interest among selected high school students.

Educational Research

Virtually no systematic effort is being made in higher education to discover the effectiveness of current instruction about the facts of atomic energy developments. A few articles on the educational implications of the newly released forces have been written for professional educational journals. At Colgate University there was created a special faculty committee on atomic energy which, after a year of discussion, recommended educational policies on the subject which were subsequently adopted by the administration.

The only major research project reported was that of the college of education of the University of Illinois. The objective of the undertaking is an analysis of how much a child's education about social effects of atomic energy influences his parents' knowledge of the subject. Tests will be made on the students of four selected high schools and their parents.

Is Special Consideration of Atomic Energy Necessary?

Apparently many more institutions of higher education are concerned with the physical aspects of atomic energy than with the social. In fact, very few are giving any special, systematic attention to the educational implications of the problems confronting the world as a result of the newly released forces.

Many educators justify their apparent indifference by the frank admission that they do not have sufficient information to permit modifying their prewar teaching. Others say that special consideration of the new problems that have arisen because of the bomb is unnecessary and undesirable. Continuous bombardment of students and the public with such problems, they maintain, will lead to a general attitude of fatalism. Another group complains that inadequate funds hamper their doing what they should be doing. Some of the latter group suggest (to paraphrase one of their statements) that the Federal Government, which has spent billions on releasing the genie ought to bear some responsibility for paying the costs of getting him back into the bottle.

Those who believe that Hiroshima was a very special event in human history are impressed with the weighty obligations of educators to help unravel some of the horrible and fascinating problems newly created. Since those problems are both technical and intellectual, educators find that circumstances have given them a virtual monopoly of knowledge of this new phase of human affairs. They therefore believe that in a democracy they must share that knowledge without reservation with those who must make the basic decisions of the future. It is they who are taking the pains to revamp old courses, start new ones, speak and write and broadcast for popular consumption, and do whatever else they can to give and gain wisdom on what they consider to be history's gravest crisis.

The National Laboratories and the Atomic Energy Program

By ROBERT TUMBLESON*

THE LAW establishing the U. S. Atomic Energy Commission made the new agency responsible for conducting research and development in fields relating to atomic energy. The commission is authorized both to maintain independent research establishments and to use existing facilities of the public, university, and industrial laboratories of the Nation.

Scientists, like all creative persons, seem to work best in an atmosphere of freedom: freedom to debate and discuss ideas openly with others; freedom to test theories and hunches; freedom to make systematic search for the facts which will shed light into the physical and biological meaning of our world.

How can scientific talent be brought to bear on the national atomic energy program at the same time preserving the atmosphere in which scientists work best? To some extent atomic energy research can be farmed out on contract to nonproject laboratories. But the enormous cost of modern research facilities, particularly of those associated with atomic energy, precludes widespread duplication by most nongovernmental agencies. Moreover, the necessity for secrecy in many phases of research and the woeful shortage of scientific manpower require other solutions to the problem.

Out of these realities has evolved the system of national laboratories. In these great research centers the immensely costly research tools and equipment can be shared by a large part of our scientific community. Available manpower representing many sciences can be assembled for efficient team attacks on general development problems, and the facilities can be used for training new scientists. Necessary security measures can be maintained relatively easily. At the same time, and perhaps most important, these centers, closely associated with the universities, retain much of the atmosphere of freedom so vital to scientific progress. Three national laboratories have been established to date.

Argonne National Laboratory

In the earliest stages of the atomic bomb project, a group of scientists were brought together at Chicago to form the Metallurgical Laboratory. Later the Argonne National Laboratory was constructed at an isolated site in the Cook County forest reserve. This was done primarily to remove to a more remote area the low-power chain-reacting pile originally built at Stagg Field. A heavy-water pile was also built at Argonne, and the site became a center of atomic energy research.

Soon after the war, to permit other universities and research institutions to participate in the research use of the Argonne facilities, the Argonne National Laboratory was organized in its present form. The University of Chicago acts as contractor for the Commission, but a total of 30 participating institutions in the Midwest take part in development of research policies.

Argonne National Laboratory is today a center for the Nation's nuclear reactor development program. Here, reactor design and theory, as well as supporting research into the fundamental properties of materials, are carried out. The laboratory, now in several widely scattered locations in and near Chicago, will soon be consolidated into a well-knit physical plant in Du Page County, Ill.

Each of the participating universities appoints a member to the council of representatives, and the council in turn elects a board of governors of the Argonne Laboratory. The council advises the Atomic Energy Commission in this election of the operating contractor for the laboratory, and it is particularly interested in encouraging all universities and institutions in the area—nonmember as well as member—to use the unique research facilities at Argonne.

Brookhaven National Laboratory

The Brookhaven National Laboratory was founded by joint effort of the Atomic Energy Commission and the major universities in the northeastern region of the United States. It was created to provide facilities necessary to enable scientists in this region to carry on fundamental and applied research in the nuclear sciences and to train themselves and others in the techniques of these sciences.

The first pile, now under construction, was designed

(*Concluded on page 132*)

*United States Atomic Energy Commission.

AEC Fellowship Program To Stimulate Study of Nuclear Sciences

By ALFRED B. BONDS, Jr.*

THE ACT which established the Atomic Energy Commission recognized the necessity for assisting and fostering both public and private research and development and for encouraging scientific progress in the atomic energy field. The Commission is carrying out its obligation to provide impetus to scholarly achievement in the atomic energy field by establishing fellowship programs in two major areas. Medicine, biology, and health physics comprise one major area, the physical sciences the other. These fellowship programs are among the latest additions to the Federal Government's historic policy of aiding the expansion of our national intellectual resources. The Commission expects expenditures to reach $2,000,000 a year when the program is fully under way.

Persons who receive these awards are not obligated to accept, nor are they assured of, employment with the Commission or its contractors. It is anticipated, however, that fellows trained under these programs will become leaders in their respective fields and will therefore have ample opportunity for employment.

Medicine and Biology Fellowships

Fellowships in medicine and biology are available to pre- and post-doctoral students, and awards may be made to applicants from any branch of biology or medicine. The Commission policy, however, is to favor those candidates who intend to pursue a research career in basic biological or medical sciences as they relate to the nuclear science field. The stipend for these awards is based upon a variable scale which takes into account such factors as the marital status, number of children, and the place of study. Most of these fellowships may be extended over a period of at least 2 years.

In the summer of 1948 a new group of awards was announced in the medicine and biology area. The awards were established to increase the supply of trained personnel in the field of health physics. The profession of health physics is concerned with the protection of personnel against radiation hazards encountered in the atomic energy industry. Health physics training will extend over a period of 1 year or longer, depending upon the needs and the qualifications of the individual graduate student.

Physical Science Fellowships

Fellowships in the physical sciences embrace such fields as physics, chemistry, metallurgy, mathematics, geology, and astrophysics. As in the case of biology and medicine, the awards in the physical sciences will be available for both pre- and post-doctoral study and research. Postdoctoral awards will normally be tenable for a 1- or 2-year period. The predoctoral awards, normally tenable for the same period, are intended to enable fellows to complete their research work for the doctorate.

Assistance to Institutions

The number of institutions in which atomic energy can be studied is limited. The relative newness of the field, the lack of a well-established scientific discipline, the very heavy expense of the equipment used, and the general shortage of competent teachers have considerably narrowed the number of institutions offering such work.

The Commission has taken several important steps aimed at relieving these handicaps. Arrangements have been made, for example, to establish a series of courses for faculty members who will teach these new students in the medical and biological fields. Such courses have already been held at the Oak Ridge Institute of Nuclear Studies in Tennessee and at the Brookhaven National Laboratory at Long Island, N. Y.

In the fields of biology and medicine progress has also been made in developing a series of regional training centers which are operated by a single university or a group of universities in a given area. In February 1948, six centers were established to offer training to AEC fellows in the medical and biological fields. These centers are located in North Carolina, New York, Texas, Colorado, California, and Oregon.

Administered by National Research Council

The administration of these programs has been placed within the National Research Council of the National Academy of Sciences in Washington, D. C. The Council has assumed responsibility for publicizing within the colleges and universities availability of the awards for selecting the fellows, and for

*United States Atomic Energy Commission.

reviewing their progress. By November 1948, approximately 250 awards had been made. Inquiries on the program and requests for application forms should be addressed to the Fellowship Office, National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

Students Participate in University Councils on Atomic Energy

By JENNINGS B. SANDERS*

STUDENTS AND TEACHERS are coming to regard an awareness of the potentialities of atomic energy as a major educational goal. In several institutions student concern with the problem has taken an organized form, either independently or in cooperation with the faculty.

Southern California's CAI

The University of Southern California's "Council on Atomic Implications," which originated with a group of veterans and a professor, was organized in February 1947. Membership, which includes business and community leaders as well as campus representatives, increased rapidly. The council is concerned with encouragement of civilian use and knowledge of atomic materials, with avoidance of atomic war, and with means of protection in the event of such war. Its activities include study and research in science and social science, the request for pertinent advice from experts, and the accumulation of a library. The council says that "the acts and views of the CAI membership should not be considered as those of the University or its administration."

The CAI has a speakers panel which has provided lecturers for numerous groups; it gives radio programs, issues news releases, and assists public libraries with displays of atomic education materials. It also maintains a film service which has provided films for audiences estimated to total 170,000. The council organizes similar groups in other colleges and expects to become a systematically staffed and financed service organization on the university campus. The group recently announced that it was "being organized into a nonprofit corporation, the better to do business and to solicit contributions."

Michigan's Phoenix Project

Students as well as administration, faculty, and alumni are represented on the University of Michigan War Memorial Center devoted to atomic research. The memorial's name, "Phoenix project," was drawn from the ancient myth of new life arising from destruction. Primarily a coordinated research undertaking, the Phoenix project, said President Ruthven, "is regarded as the best way to provide a living, timeless, creative force for the peace which was so dearly won in World War II and for which we must always work to save."

Student Interest Elsewhere

At the State College of Washington a student "Committee on Atomic Energy and Its Implications" has sponsored numerous discussions and forums, and at Sweet Briar College an institute was organized in 1946 to discuss "Reconstruction in an Era of Atomic Power." Discussions among student groups followed each series of institute lectures. Students participated actively in the Morgan State College "Atomic Energy Project," which has assembled materials on atomic energy for exhibit. Some 3,000 persons are reported to have seen the exhibit at Morgan State College and 1,240 at Georgia State College, where the exhibit was on loan.

The exchange of student opinion in colleges on atomic education is a phase of the work undertaken by the "Atomic Education Committee" at Alabama Polytechnic Institute. Designed as a clearinghouse for campus-community atomic education activities, the committee hopes to help create a public opinion "which will demand that atomic energy be directed toward constructive and humane purposes."

At Stanford University, a 1947 organization actively interested in atomic-energy implications has since merged into the "United World Federalists." A student activity at Colgate University, the "Colgate Movement for International Action," has promoted discussions of a variety of subjects, including atomic energy, and has been of some influence with small groups and with other institutions of the area.

* Specialist for History, Division of Higher Education, Office of Education.

(*Declassified Documents Release No. 11*, May 1948, tion" notes in the list include: (1) Citations to such

Guides to the Literature on Atomic Energy

By KATHERYN SULLIVAN and RALPH M. DUNBAR*

THESE NOTES about some of the guides to the rapidly expanding body of literature on atomic energy have been compiled primarily for instructors and students rather than for specialized research workers. The following bibliographical aids have been selected as representative.

Comprehensive Bibliographies

The United Nations Atomic Energy Commission, Lake Success, N. Y., has prepared a preliminary edition of *An International Bibliography on Atomic Energy*. Volume I covers political, economic, and social aspects; volume II covers scientific aspects. The Commission plans to publish a final edition of this bibliography early in 1949, providing a guide to the documents of the United Nations, the relevant publications of various governments, and the large collection of published literature.

The Library of Congress has announced that beginning with Series III, No. 1, January 1949, its monthly bibliography, *Atomic Energy: Significant References Covering Various Aspects of the Subject; Arranged Topically*, will be made available for sale through the Card Division of the Library of Congress. These annotated references are prepared daily and cumulated monthly by the Information Section, Legislative Reference Service, for the use of the Joint Congressional Committee on Atomic Energy. (Subscription price $1.50 per year.)

Selective Bibliographies

A number of useful bibliographies on atomic energy have appeared as appendixes to articles and reports by specialists and committees: For example, the current issues of the *Bulletin of the Atomic Scientists*, published monthly by the Atomic Scientists of Chicago, 1126 East Fifty-ninth Street, Chicago 37, Ill. (subscription price $2.50 a year); or, "Bibliography on Isotope Utilization," appendix 5, pages 167–192, in U. S. Atomic Energy Commission's *Fourth Semiannual Report* [1] (for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 35 cents).

An example of a special-purpose bibliography for the use of schools and discussion groups is: *Annotated Bibliography on Atomic Energy* by Israel Light, Bureau of Publications, Teachers College, Columbia University, New York, 1947. (35 cents.)

A mimeographed price list, *Publications Relating to Atomic Energy Available from Superintendent of Documents*, may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. This list includes such general or nonscientific documents as the Atomic Energy Act of 1946; Congressional hearings; and Department of State publications on international control of atomic energy and its published reports of the United Nations Atomic Energy Commission.

Science Abstracts

Nuclear Science Abstracts (vol. 1, No. 1, July 15, 1948) supersedes *Abstracts of Declassified Documents*. These abstracts are prepared from reports declassified by the U. S. Atomic Energy Commission and from articles appearing in the published literature, both foreign and domestic, pertaining to atomic energy. An author, a subject, and a foreign geographic index are contained in each issue. Cumulated indexes will be provided for each semiannual volume. This journal, issued semimonthly, may be obtained from the Documents Sales Agency, P. O. Box 62, Oak Ridge, Tenn. The 1948 subscription basis was $3.75 for the 12 issues of volume 1; rates for 1949 will be announced later.

Declassified Documents

AEC declassified documents indicated as available in *Nuclear Science Abstracts* and also comprehensive current price lists of available documents may be obtained from the Documents Sales Agency. Although these declassified documents were not written for publication, they are made available in their original form, and without review by the author, because of the urgency in releasing information to the public. *List No. 6* (October 1948) is a revised and combined listing of all documents to date. Additional lists will be issued as more documents become available.

The AEC's Technical Information Branch at Oak Ridge, Tenn., also issues a list of the documents

*Miss Sullivan is Bibliographer and Mr. Dunbar, Chief of the Service to Libraries Section, Office of Education.

[1] Published also with the title, *Recent Scientific and Technical Developments in the Atomic Energy Program of the United States.*

(*Declassified Documents Release No. 11*, May 1948, a cumulation of Releases 1 to 10, supplemented by later releases) "which have been declassified by the Atomic Energy Commission and which have been released through the Office of Technical Services, by publication in a journal, or through sales by the Atomic Energy Commission." The form of release is indicated for each document. These "Disposition" notes in the list include: (1) Citations to such periodicals as *Physical Review* and *Journal of the American Chemical Society;* (2) AEC Documents Sales Agency prices; or, (3) OTS PB numbers (order numbers used by the Office of Technical Services, Department of Commerce). These documents may also be obtained from the Documents Sales Agency at the address previously cited.

Atomic Energy Films

By SEERLEY REID*

IN GENERAL, the atomic energy films so far produced fall into three broad classes: (1) Those attempting to explain the scientific principles of atomic energy; (2) those recording the history of atomic energy, particularly the use of the atomic bomb; and (3) those exhorting their audiences to various kinds of moral behavior. The following films have been so classified.

The Office of Education neither approves nor disapproves any of these films and recommends strongly that teachers or adult leaders preview the films before using them.

Scientific Films

Atomic Energy. 16-mm. sound, black and white, 11 minutes, 1947. Produced and distributed by Encyclopedia Britannica Films Inc., 20 North Wacker Drive, Chicago 6, Ill.

A science-teaching film showing by means of animation how nuclear synthesis is accomplished, how radiant energy is released, and how nuclear fission and the chain reaction are effected.

Atomic Physics. 16-mm. sound, black and white, 90 minutes, 1948. Produced by the J. Arthur Rank Organization and distributed in the United States by United World Films Inc., 445 Park Avenue, New York 22, N. Y.

Consists of five parts: (1) History of the atomic theory; (2) rays from atoms; (3) nuclear structure of the atom; (4) atom smashing and discovery of the neutron; (5) uranium fission and the release of atomic energy.

Record Films

Atomic Bomb Tests—Bikini Island. 16-mm. sound, black and white, 18 minutes, 1947. Produced and distributed by the U. S. Navy.

Film record of the atomic bomb tests at Bikini compiled by editors of Paramount News from the best public release motion pictures of the tests.

Atomic Power. 16-mm. sound, black and white, 19 minutes, 1946. Produced and distributed by the March of Time (Forum Edition), 369 Lexington Ave., New York 17, N. Y.

Series of historical reenactments, in which Einstein and other scientists appear, of the progress of research in atomic energy from before the war to the first desert test of the bomb.

Operations Crossroads. 16-mm. sound, color, 27 minutes, 1946. Produced and distributed by the U. S. Navy.

An official Navy film record of the two Bikini test explosions.

Tale of Two Cities. 16-mm. sound, black and white, 10 minutes, 1946. Produced and distributed by the U. S. Army.

Shows the destructive effects of the atom bombing of Hiroshima and Nagasaki, including the effects of the blast and radiation upon buildings and people.

Moralistic Films

Church in the Atomic Age. 16-mm. sound, black and white, 20 minutes, 1948. Produced by RKO-Pathe for Film Forum Foundation. Distributed by Film Program Services, 1173 Avenue of the Americas, New York, N. Y.

Reviews the bombing of Hiroshima and Nagasaki; raises the question of the moral justification of its use; and propounds the question of whether war today can be justified under any circumstances.

One World or None. 16-mm. sound, black and white, 9 minutes, 1947. Produced by Philip Ragan. Distributed by Film Publishers, Inc., 25 Broad Street, New York 4, N. Y.

An animated film showing the destructiveness of the atomic bomb, warning that there can be no defense against the bomb, and expressing the opinion that there must be international control of atomic energy.

Where Will You Hide? 16-mm. sound, 20 minutes, 1948. Produced by the Audiographic Institute.

* Assistant Chief, Visual Aids to Education, Office of Education.

FEB 14 '49

Distributed by Encyclopedia Britannica Films, Inc., 20 North Wacker Drive, Chicago, Ill.

Attempts to frighten the audience into a realization of the danger of the atomic bomb to civilization.

God of the Atom. 16-mm. sound, color, 38 minutes, 1947. Produced and distributed by Moody Bible Institute, 153 Institute Place, Chicago 10, Ill.

Presents elementary demonstrations suggesting the existence of the atom, followed by views of the Bikini tests. Points out that "God is there" and that mankind should return to the ways of God.

National Laboratories

(*From page 127*)

for optimum flexibility and for the accommodation of a large number of simultaneous research projects. This nuclear reactor and the facilities ancillary to it, the Van de Graaf generator, a possible betatron, and the related laboratories, will be the focus of nearly all research in physics, chemistry, engineering, biology, and medicine at Brookhaven.

Each of the nine institutions forming the corporation appoints a representative to the board of trustees, which is responsible for selecting operating personnel for Brookhaven. Use of laboratory equipment and facilities is by no means limited to scientists of these universities, but all institutions in the area are invited to participate.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory in Tennessee, formerly known as the Clinton National Laboratory, was built for the Manhattan District as a pilot plant and training center for the huge plutonium production piles then being constructed at Hanford, Wash. It has been operated under contract with the University of Chicago, the Monsanto Chemical Co., and currently by the Carbide and Carbon Chemical Corp.

Research at Oak Ridge National Laboratory naturally centers on the large air-cooled, graphite-moderated reactor. It includes the study of such problems as the preparation of materials for irradiation, the chemical changes that take place in substances exposed to the intense radiations in the reactor, the extraction and purification of radioelements from irradiated materials, the combining of radioelements into useful compounds, the use of these compounds in tracer analysis of innumerable chemical and biochemical reactions, and the effects of radiation and radioactive substances on living matter.

The Oak Ridge Institute of Nuclear Studies, composed of 19 southern universities, was chartered on October 15, 1946, to promote the development, applications, and use of the research facilities at Oak Ridge. The institute is a nonprofit corporation which operates under a contract with the Atomic Energy Commission.

In pursuit of its objective, the institute has launched four major programs since its inception:

1. *The Research Participation Program* brings university faculty members and other competent research workers to Oak Ridge for periods of research.
2. *The Graduate Training Program* permits candidates for doctorates in the sciences to complete thesis research in the Oak Ridge National Laboratory.
3. *The Radioisotope Training Program* provides short, intensive training courses for mature research workers, who hope to apply this important new technique to their own problems.
4. *The Resident Graduate Training Program*, operated by the University of Tennessee under institute subcontract, permits scientific personnel employed at Oak Ridge to continue their education at the graduate level.

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